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Alberta School Building Handbook.
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ALBERTA

SCHOOL BUILDING HANDBOOK



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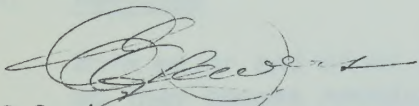
DEPARTMENT OF EDUCATION

Edmonton, Alberta
May 10, 1967

To: Secretary-Treasurers,
School Districts, School Divisions
Counties, and Registered Architects.

The Alberta School Building Handbook

Please find enclosed Sections Ia, II, III and IV of the 1967 edition of the above publication. Sections Ib and V will follow in the near future.


C.G. Jewers
Supervisor of School Buildings

THE ALBERTA SCHOOL BUILDING HANDBOOK

Section I: Introduction

1. Intent of the Alberta School Building Handbook

The suggestions herein contained are intended to facilitate co-operation between the Department of Education, local school authorities, architects, engineers, and contractors, in an endeavor to secure, with reasonable economy, the best possible educational facilities. The contents are not regulatory; however, suggestions here presented have been developed by consultation with many authorities, and should be considered carefully in planning school buildings.

2. Regulations Regarding School Buildings

The regulations under the School Buildings Act shall invariably take precedence where they and any section of this handbook appear to be at variance. The National Building Code of Canada 1965, local by-laws, provincial and federal regulations shall be observed.

3. Organization of this Handbook

This handbook is divided into five sections:

Section I a:	<u>Introduction</u>	- (White)
Section I b:	<u>Index</u>	- (white)
Section II :	<u>General Considerations</u>	- (pink)
Section III :	<u>Architectural Considerations</u>	- (yellow)
Section IV :	<u>Mechanical & Electrical</u>	
	<u>Considerations</u>	- (green)
Section V :	<u>Instructional Areas</u>	- (blue)

4. Revision

Both major and minor revisions will be made from time to time, as they become necessary, and will be made available in the form of revised sections or addenda. Addenda will be colored according to the section to which they pertain, and should be included in your copy at the end of the relevant section.

Index (Section I b) will be issued annually, dated approximately January 1 of each year, and will summarize the current sections and relevant addenda.

5. Inquiries and Interpretations

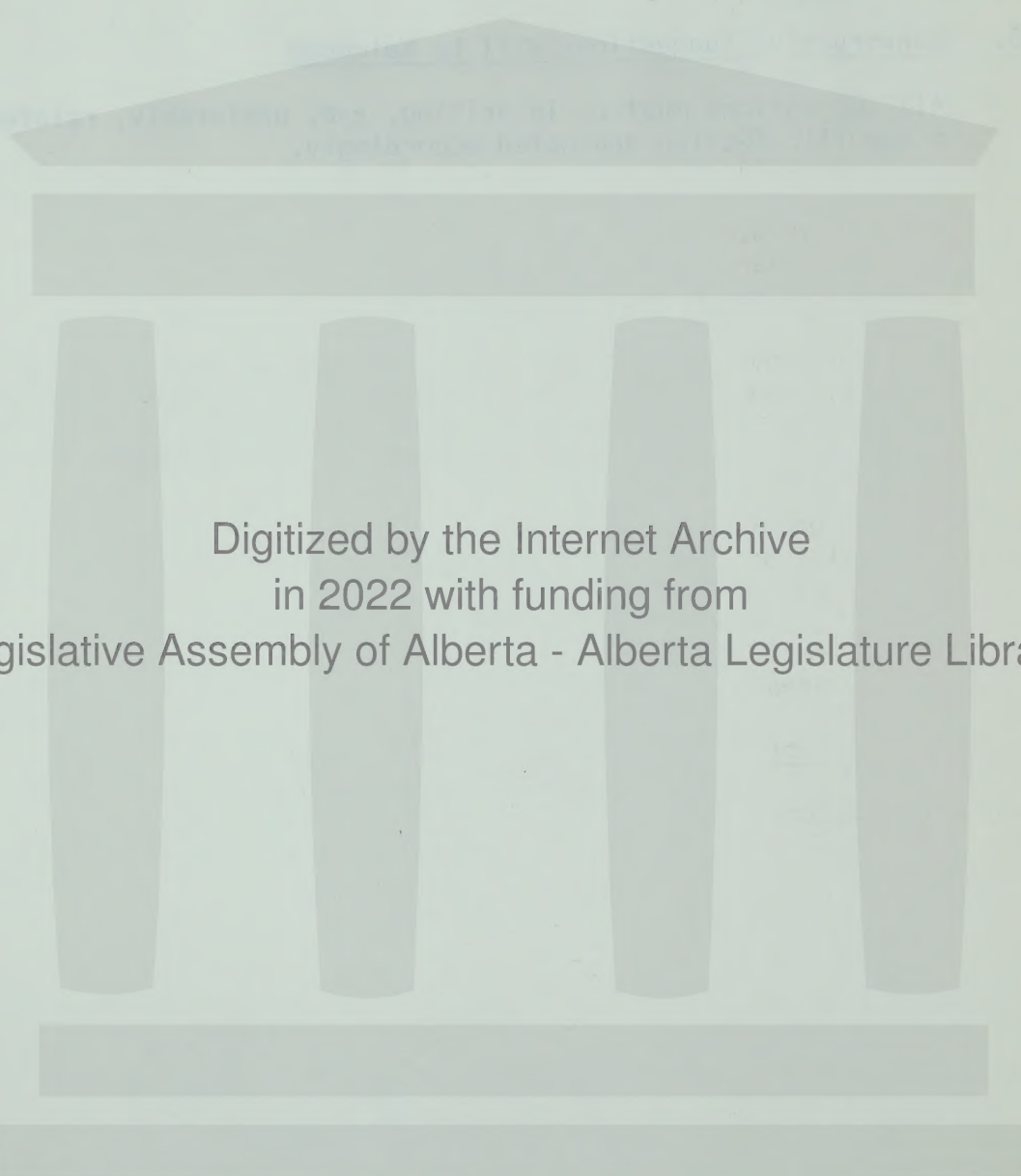
Inquiries regarding the contents of this handbook should be

directed to:

The Supervisor of School Buildings,
Department of Education,
Edmonton, Alberta.

6. Constructive Suggestions will be Welcomed

All suggestions must be in writing, and, preferably, related to a specific section and noted accordingly.



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THE ALBERTA SCHOOL BUILDING HANDBOOK

Section II: General Considerations

1. Responsibility

Architects, engineers, contractors, supply and equipment houses, as part of their services on a building project within the terms of the contract with each other and with the school board or county council are responsible for producing a building which is structurally, mechanically, and electrically safe and sound and in accordance with the suggestions contained in this handbook.

School authorities shall employ registered architects and professional engineers for school building projects in accordance with the provisions of the Alberta Architects Act, and The Engineering and Related Professions Act.

2. Aesthetics

The question of aesthetics in school planning should be given special attention. The modern school building should be of good design. It should be inviting and exemplify the teachings of beauty and good taste. Simplicity without barrenness is desirable. The principles of good proportion, attractive composition, and harmonious setting should be applied to both exterior and interior design.

3. Orientation

- a. The building should be so designed and so located on the school site that the most effective method of controlling solar heat and glare can be utilized.
- b. Industrial arts, home economics, drafting and art classrooms should receive north light wherever possible, or special care and provision should be made to obtain the quality of lighting necessary for these services.
- c. The building should be located on the school site with the main front toward the road or street.

4. Landscaping

Landscaping of grounds should be carefully considered. This involves grading, planning of walks and driveways, arrangement of recreational spaces and beautification of the grounds.

Careful consideration should also be given to provision of suitable staff and public parking areas, conveniently located.

5. Economies in School - Plant Planning and Construction

Proper architectural design and planning can result in economical construction. The following suggestions should be

given careful consideration:

- a. Select the school site in terms of the type and size of the school to be accommodated, including land for possible future expansion, and the nature of the school's educational program.
- b. Hold numerous conferences between architect and school personnel in translating educational specifications into building sketches.
- c. Show on initial plans current project, and ultimate development of building and site. Make provision in initial plans for future probable expansion of the school so that the building may be enlarged at a reasonable cost. Serious consideration should be given to items such as site adequacy and utilization; location and layout of heating, ventilating, plumbing, and electrical systems; and structural design.
- d. Plan for efficient use of interior spaces. Endeavor to maintain a high ratio of instructional space in relation to total area.
- e. The building perimeter should be kept to a minimum.
- f. Where masonry construction is proposed avoid intricate masonry designs. Screens to reduce solar radiation in exposed areas may be included, if needed.
- g. Use repetitive design elements such as windows and doors.
- h. Adapt each building to its particular site so as to minimize cutting and filling.
- i. Use exterior ornamentation only if it serves a useful purpose.
- j. Eliminate waste areas such as attics, basements, and other unusable spaces.
- k. Provide the architect with complete information on factors such as:
 - i. Purposes of the building.
 - ii. Present and future enrolments.
 - iii. Size of the groups with which teachers will work, or the teacher-pupil ratio.

- iv. Educational experiences that are to be provided.
- v. Summer and after-school use of the building.
- vi. Age groups or age levels of children to be served.

Vii. Scope of curriculum content.

- l. Allow the architect ample time to complete his drawings.
- m. Initial cost should not be reduced to the point where increased maintenance and replacement costs, and insurance, will nulify any initial saving.
- n. Check drawings and specifications for completeness, conciseness, and freedom from ambiguity.
- o. Submit building plans promptly to all required regulatory and advisory authorities so that errors, discrepancies, or omissions in the plans or specifications may be corrected in time for all bidders to know of them before the closing of tenders. The issuance of change orders covering such items after the approval of the contract usually results in increased costs.
- p. In estimating the "total cost" of a building, to pass a by-law for sufficient funds, include the following:

<u>Item</u>	<u>Estimated Cost</u>
Land acquisition	\$
Construction Contracts
Architect's fee
Furniture and Equipment
Site development
Water Supply and Sewage Disposal
Prepaid Utilities
Total	\$

- q. Choose an opportune time for calling for tenders so as to encourage the maximum number of reputable contractors to submit bids on the project. The following factors should be considered:
 - i. Request bids when there is a lag in construction work.
 - ii. Consider the price and availability of different kinds of material.
 - iii. Consider the possibility of strikes which might effect construction.

- iv. Make sure the date for submission of bids does not conflict with other major bid openings.
- v. Invite all reputable firms within the area to submit bids.
- vi. Allow sufficient time for all contractors to study carefully the plans and specifications.
- vii. Allow a reasonable amount of time for the completion of the project.
- u. Avoid making changes in plans or specifications after bids are received.

6. Provision for Future Expansion

The following should be observed in planning a school building:

- a. Continue corridors to outside walls.
- b. Stairs should not be placed in corridor ends; locate them in separate extensions at right angles to corridors.
- c. Indispensable windows should not be placed in walls against which future additions might be built.
- d. Plan furnace rooms, fuel rooms, washrooms, chimneys, electrical and mechanical services to take care of possible future expansion.
- e. Place ducts, pipes and conduits in outside or corridor walls wherever possible; and make partitions as far as possible non-bearing, to permit future changes.
- f. Indicate on sketch and final plans any likely future expansion.
- g. The gymnasium should be spanned so as to permit future extension by the addition of bays.

7. Provision for Community Use

- a. Rooms which may be used by the community should be so situated as to be readily accessible from the outside without the need for passage through other portions of the building.
- b. When a portion of a school building is being used by the community, exit doors between the area being used, and the remainder of the school, should not be locked.

8. Flexibility

It is considered essential that flexibility in school design should be given special attention in order to accommodate daily changes in spaces for varying sizes of class groups, and to accommodate educational changes which will occur in the future. Daily changes in spaces and programs may be accomplished by the use of folding partitions, sliding doors, movable walls, screens, movable storage units, etc.

In order to provide for probable future changes in program and curriculum, mechanical services, partitioning, and structural components should be integrated in such a fashion as to facilitate with a minimum of effort and expense the re-arrangement of interior spaces.

9. Building Standards for the Handicapped

Attention is directed to supplement No. 7 to the National Building Code of Canada. These standards are intended to make school buildings accessible to and usable by the physically handicapped without assistance particularly in regard to entrances, corridors, classrooms and washrooms.

10. Food Service Facilities

Where it is proposed to provide food service facilities by the use of food and beverage automatic-dispensing machines, it is suggested that necessary space be attained from those areas normally specified for circulation and/or general storage.

11. Courtyards

Where courtyards are necessitated by design, it is suggested that these areas might be converted into usable interior space by roofing over, and the provision of adequate lighting, heating, and ventilating equipment.

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Section III: Architectural Considerations

1. Ceiling Heights

The following are minimum clear heights measured from finished floor to finished ceiling:

a. General classroom - 10' - 0"

b. Gymnasium:

Elementary - In accordance with the Regulations Pursuant to The School Buildings Act.

High Schools - In accordance with the Regulations Pursuant to The School Buildings Act.

c. Toilet room - 8' - 0"

d. Office, Rest room or Waiting room - 8' - 0"

e. Corridor - 8' - 0"

f. Shops - 12' - 0" to underside of beams or trusses

g. Home Economics classroom - 10' - 0"

h. All other rooms - 8' - 0"

2. Allowable Live Loads

In accordance with the provisions of the National Building Code.

3. Footings, Foundations and Basement Walls

a. Except with proper precautions or reinforcing, footings should not be laid on filled ground.

b. Where there are no basement rooms under the first floor, access panels should be provided to facilitate making repairs or inspections. These should not be installed in corridors or classrooms.

c. The exterior of basement walls should be damp-proofed from bottom of footing to finish grade line.

d. The minimum size of splash pads should be 3' - 0" x 6' - 0".

e. Where there are basement rooms, weeping tile should be installed around the exterior of the foundation for drainage purposes.

4. Entrances and Exits

- a. The minimum size of any wooden single exit or exterior entrance door should be 3' - 0" x 7' - 0" x 2".
- b. All exit and exterior entrance doors should be near outside grade level.
- c. An outside platform at least 4' - 0" in depth should be provided between any exit door and steps leading therefrom.
- d. All exterior entrance and exit doors should be protected from the weather by means of a canopy, wall recessing, or weather-stripping.
- e. Shop units should have an overhead exterior door 12' - 0" in width. (At least school bus size).
- f. Exterior entrance doors and sidelights should be glazed with a toughened safety plate glass. Interior vestibule doors and sidelights should be glazed with wired glass.
- g. Vestibules should be provided at exterior entrances.

The distance between the vestibule doors and the exterior entrance doors should be not less than 5' - 0".

Where a vestibule is designed for use as a mud room, the length should be not less than 12' - 0".

- h. Where a doorway provides means of egress from a gymnasium or auditorium, at least one door of the double type which will provide a minimum width of five feet in the clear should be installed.

5. Interior Doors

a. Number

In addition to the exits and entrances previously mentioned, the following interior doors should be provided:

- i. One door from each standard classroom, library, commercial, arts and crafts, dramatics, music, and social studies rooms; principal's office, teachers' room, pupils' washroom, medical room, and janitor's room, direct to corridor.
- ii. Two doors remote from each other from each laboratory, home economics room, industrial arts shop, lunch room, audio visual aids room, or other special purpose room exceeding 40' - 0" in length.

- iii. At least one pair of double doors (each opening not less than 3' - 0" x 7' - 0") without a mullion from gymnasium or auditorium direct to corridor or foyer.
- iv. One pair of double doors (each opening not less than 3' - 0" x 7' - 0") without a mullion from gymnasium equipment storage room to gymnasium
- v. Where a vestibule doorway provides means of egress from a gymnasium or auditorium at least one door of the double type which will provide a minimum width of five feet in the clear should be installed.
- vi. Interior vestibule doors and corridor separation doors should be installed without mullions. In the case of vestibules with more than two inner doors, at least one pair should be without a mullion.

b. Location

- i. In classrooms the entrance door should be located either near the front or the rear of the room.
- ii. Where two doors are required, they should be located near the opposite ends of the room.
- iii. In gymnasiums and auditoriums, doors should be located so as to permit rapid emptying towards the nearest exit.

c. Dimensions

The minimum size of any single interior door serving rooms used for general instructional purposes should be 2' - 10" x 6' - 10" x 1-3/4".

d. Swing

- i. Interior doors serving principal's office, teacher's room, washrooms, janitor's room, and medical room may be hung to swing from the corridor into the room.
- ii. All other interior doors should be hung to swing from the room into the corridor; these should be set in a recess so that they will not project more than nine inches into the corridor.
- iii. Double swing doors should not be used.
- iv. Where gymnasium, auditorium, or stairwell enclosure doors open into a corridor, they should be set in a recess so that they will not project more than nine inches into the corridor, or hinges so as to swing a full 180°.

e. Thresholds

Raised thresholds should not be used under interior doors.

f. Hardware

- i. Locks on interior doors which serve as a means of egress for classrooms and other pupil or staff-occupied spaces should be of a type which may be locked by key only, but should always open from the inside by turning the knob.
- ii. Locks on exterior doors not required to have panic devices should permit free operation from within at all times without a key.
- iii. Smoke barrier doors should not be equipped with lock sets, or hold-open devices. They should be equipped with only automatic door closers. Wedges should not be used to hold these doors in an open position.
- iv. Washroom doors should be provided with automatic closers with push and pull plates, and with kick plates.
- v. Each door should be hung with at least three butts.
- vi. Except where closers are used, each door should open against a door strike with rubber tip.
- vii. All interior and exterior door lock sets should be master-keyed.
- viii. Exterior entrance doors and entrance vestibule doors should be equipped with automatic door closers.

6. Fenestration

a. Dimensions

- i. In all rooms used for classes or study, windows should be provided on the exterior wall. These windows should provide a net glass area, exclusive of sash, muntins and mullions, of not less than five (5) per cent of the floor area.
- ii. In all rooms used for classes or study, the window sills should be at least 3'-0" above the finished floor.
- iii. In the gymnasium, the window sills should be at least 8'-0" above the floor.

- iv. Windows in washrooms, shower rooms, and dressing rooms, should be at least 5' 0" above the floor.
- v. Vision windows between classrooms should be not over 3' - 0" above the floor.

b. Glazing

- i. In washrooms, dressing rooms, and shower rooms, glazing should be with obscure glass.
- ii. Skylights should be glazed with wire glass.
- iii. In classrooms the use of heat-resisting and glare-reducing glass is worthy of study.

7. Corridors

- a. Any sudden reduction in corridor widths should be avoided.
- b. The projection into the corridor width of structural piers or of equipment should be avoided.
- c. Minimum corridor width, clear of obstruction should be 8' - 0". Secondary corridors or passages used by pupils should have a minimum clear width of 6' - 0".
- d. Steps should not project into corridors.
- e. Corridors should provide direct passageway from all rooms to an exit or stairway. There should be no dead ends or pockets in line of traffic to an exit or stairway.
- f. Trunk lines of pipes or ducts should not run exposed in corridors, but should be accessible for repairs.
- g. Walls of corridors to a height of at least 6' - 0" should be faced with or constructed of hard, smooth, scratch-proof material, easily cleaned and maintained.

8. Stairways and Ramps

- a. No stairway for pupil use should be less than 3' - 8" wide, clear of handrails.
- b. Stairways should be of constant width throughout their length.
- c. Stairways should be located adjoining outside walls and should open directly to the outside.
- d. Stairways should not be placed in pockets or dead ends but should be fully open to egress.

- e. Ramps should not exceed a grade of 12" rise to 10' of run. Ramp floors should be of non-slip material.

- f. Risers for elementary schools should not exceed 6½".

Risers for junior and senior high schools should not exceed 7".

Treads, exclusive of nosing and overhang, should be not less than 10½" in width.

The front or outer edge of treads and landings should have a non-slip surface flush with adjoining surfaces.

- g. No stairway should be constructed with winders or angle treads.

- h. No stairway should have a height of more than 8' - 0" between landings.

Between runs there should be an intermediate landing of at least the same clear width and depth as the stairway.

No door should open immediately at the top or bottom of a flight of stairs; a landing at least the width of stairs should be provided between such a door and the stairway.

- i. Handrails should be provided on both sides of every stairway for pupil use.

Handrails should not encroach upon the required width of stairways.

Handrails should be returned, top and bottom, against the wall.

Where steps are provided from an assembly area to a fore-stage, a handrail should be provided on the stage side of steps.

- j. Stairs should be adequately lighted naturally by windows, as well as by artificial means.

- k. A flight of stairs should have at least three risers.

- l. The vertical distance from the floor or nosing to the top of balustrades on the open side of stairways or landings should be not less than 3' - 0".

- m. Spaces between balusters or any open space in balustrades should not exceed 6" in width.

- n. Wherever possible ramps should be substituted for runs of two risers or less.

9. Painting, Finishing and Decorating

a. Exterior

Exterior wood surfaces should be painted with suitable exterior paints.

b. Interior Trim

Interior trim and doors should be given a clear light varnish; gloss varnish and dark stains should not be used.

c. Classroom - Walls and Ceiling

- i. Paints used on ceilings should have at least an 80 per cent reflection factor.
- ii. Paints used on walls should have at least a 60 per cent reflection factor.
- iii. Paints used on the wainscot and baseboard, as well as the trim, should have a 40 to 60 per cent reflection factor.
- iv. Paints used on walls and ceilings should be of non-glossy, flat, or matte type.

d. Floors

Oil finish should not be used. Floors should provide a 30 to 40 per cent reflection factor.

e. Desks and other Equipment

Desks and other equipment should have a 30 to 40 per cent reflection factor.

f. Chalkboards and Tackboards

Chalkboards and tackboards should have at least a 20 per cent reflection factor.

g. Acoustic Material

- i. Acoustic material should be of a type which permits repeated cleaning without destroying its value.
- ii. It should have at least a 60 per cent reflection factor.

10. Chalkboards and Tackboards

a. Chalkboards

A minimum of 100 square feet of chalkboard should be provided for each classroom. Chalkboards should not be placed on the same wall with windows. Height of chalkboards should conform to the following table:

<u>Grades</u>	<u>Width of Chalkboard</u>	<u>Distance from Floor to Top of Chalk Trough</u>
1-8 (ungraded schools)	48"	26"
1-2-3	42" to 48"	26" to 28"
4-5-6	42" to 48"	29" to 31"
7-8-9	42" to 48"	32" to 34"
10-11-12	42" to 48"	35" to 37"

b. Tackboards

At least 60 square feet of tackboard should be provided in all classrooms. Tackboards should be easily pierced, fairly retentive, and capable of withstanding repeated tacking.

11. Acoustics

a. Noise and Reverberation

The exclusion of noise (unwanted sound) and the control of reverberation, should be given consideration in making classrooms suitable for oral instruction.

b. Site

Where the site is noisy, care should be taken in the design of outside walls, and the location of rooms.

c. Outside Walls

- i. Wherever possible, classrooms should be located away from industrial arts shops, gymnasiums, furnace rooms, and the "street" side of the school. When this is not possible, special precautions should be taken such as increased wall and ceiling insulation, and fitting of doors.

- ii. Windows should be double glazed when in noisy locations.

- iii. Windows should be spaced for the longest path of airborne noise between the rooms.

d. Layout of Rooms

Long narrow classrooms, and excessively large classrooms should be avoided (a ratio of width to length of 5:6 is considered suitable).

e. Corridors and Doors

- i. The doorways along corridors should be staggered so as to eliminate the direct path of noise from classrooms directly across the corridor.
- ii. All doors should be tight fitting, and have draft stops at the bottom to prevent sound leaks.
- iii. The ceiling and upper part of the walls should be treated with absorptive materials.
- iv. Borrowed lights between the classrooms and corridors should be double glazed with felt mounted panes.

f. Partitions

Partitions separating classrooms, should provide high sound insulation.

g. Floors

Floor systems should insulate against impact noise transmission, and airborne noise.

h. Ventilation

- i. Care should be taken in the design of ventilating systems so as to prevent noise leakage through wall openings, and to reduce vibration and solid-borne noise.
- ii. Where a ventilating opening is required in a wall, the use of an absorptive plenum incorporating lined bends should be given consideration.

12. Approval of Plans

Plans submitted to the Department of Education for final approval should include the following:

- a. Site plan to scale, showing points of compass and the size and shape of the entire site.

Block plan of new building, existing building, and any likely future additions, all accurately located.

Finished contours, with finished grades at building and elevation of the first floor, general landscaping with location of walks, drives, playing areas, parking areas, adjoining sidewalks, streets, etc.

Location of sewage disposal system or sewer, water, gas, and electrical services.

- b. Floor plans for each floor and of the roof at not less than 1/8" scale. These should include completed figures so that all sizes of rooms, wall thickness, method of fabrication, materials, etc., can readily be determined.

All fixed utilities, built-in equipment, door swings, etc., should be clearly indicated.

If the structure is in the nature of an addition or alteration, there should be a clear indication to show those parts which may be existing, added or remodelled.

The purpose of each space should be designated.

- c. At least three elevations at the same scale as the floor plans.
- d. As many sections as may be required at the same scale as the floor plans to show the necessary details of construction.

A typical classroom wall section through a window at not less than 1/8" scale showing floors, walls, sills, jambs, heads, ceilings, cornices, parapets and copings and indicating the true relation of window heads to ceilings.

Typical stairs, corridors, rooms, furred ceilings, built-in equipment, fixtures, floor construction, levels and thicknesses, wall construction, windows, doors, finish materials, roof construction, etc.

- e. The plans, elevations and sections should be supplemented by the following detailed plans as found necessary:
 - i. Sections of walls, footings, foundations, slabs, floors, windows, doors, cornices, roofs, etc.
 - ii. Trim, including doors, windows, panelling, acoustic treatment, chalkboards, tackboards, etc.

- iii. Built-in fixtures and equipment, including counters cabinets, showcases, lockers, shelves, drawers, etc., unless of standard manufacture.
 - iv. Stair details showing treads, risers, handrails, landings, etc.
 - v. Schedule of interior finishes such as floors, dado, wall, ceiling and trim.
- f. Structural drawings at the same scale as the floor plans, unless this information is shown on the floor plans.

The sizes of all concrete and steel columns, beams, trusses, girders, joists, slabs and reinforcing.

Complete details, diagrams, and schedules as required for a complete understanding of the drawings.

- g. Plumbing drawings at the same scale as the floor plans, unless this information is shown on the floor plans.

All footing drains, storm and sanitary sewer lines, water supply systems with pipe sizes, stack vents, traps, clean-outs, valves, tanks, fixtures, bibbs, and hose cabinets.

Connections to water and sewer services should be indicated. If private systems are required, the sewage disposal and water supply systems should be shown in sufficient detail to make their installation and operation clear.

- h. Heating and ventilating drawings at the same scale as the floor plans, unless this information is shown on the floor plans.

The size and type of boilers or furnaces, boiler room equipment, pumps, tanks, valves, traps, supply and return lines, fall of lines, zones, controls, etc.

Type, size, location and capacity of motors, fans, ventilators, ducts, grilles, heating units.

- i. Electrical drawings at the same scale as the floor plans, unless this information is shown on the floor plans.

All electrical drawings, or floor plans on which electrical detail is shown, should be sufficiently detailed that an examination will determine their conformity with applicable regulations.

Electrical drawings should include all pertinent equipment and installation detail with respect to clock, bell, radio, public address, alarm, and like electrically operated systems.

The type and capacity of all lighting fixtures.

A schedule showing the expected maintained artificial light intensity in foot candles on the working plane in each room should be prepared.

- j. A complete specification should accompany the final drawings. The specification should supplement the drawings so that the two, if read in conjunction with one another, will give a complete, detailed understanding of the proposed building contract.
- k. Detail plans of special areas, such as shops, home economics, laboratories, library, and classrooms of unconventional shape, shall be submitted to the department for approval with the sketch and final drawings.
- l. Include charts showing heights of equipment, built-in fixtures and building appurtenances.
- m. Indicate on sketch plans for additions the area in square feet of the existing building.

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Section IV: Mechanical and Electrical Considerations

I. Heating

- a. The physical comfort of the pupils and staff should be the objective of the heating-ventilating system. The maintenance of a relatively constant comfortable room temperature contributes to this objective.
- b. The temperature ranges should be as follows:

<u>Type of Space</u>	<u>Room Air Temperature Fahrenheit</u>	<u>Level at which Reading is taken</u>
Sedentary Activity classrooms, audi- toriums, offices, lunchrooms	68 to 72 degrees	30" above floor
Moderate Activity corridors, stair- ways, shops, lab- oratories, kitchens	66 to 70 degrees	60" above floor
Vigorous Activity gymnasium	60 to 70 degrees	60" above floor
Locker and shower rooms	76 to 80 degrees	60" above floor

- c. Differences in temperatures from the floor level to a level of 60 inches above the floor should not be more than 3 degrees.
- d. Heating plant capacities should be ample to provide and maintain, without overloading, the temperature ranges as outlined in I b, under the most severe local weather conditions.
- e. Auditoriums, gymnasium, shops, and other parts of a building likely to be used by the general public outside of regular school hours should be individually zoned for independent temperature control.
- f. Each classroom shall, where reasonably possible, have individual heating controls.

2. Ventilation

- a. Provision should be made in all school areas occupied by groups of children for introducing fresh air into the room and for exhausting excess heat and odors from it. Toilet rooms should be given special consideration.
- b. In areas occupied by groups of children, the following fresh air requirements should be provided:

<u>Air Space Per Person</u> <u>Cubic Feet</u>	<u>Outdoor Air Supply</u> <u>CFM Per Person</u>
100	29
200	21
300	17
500	11

- c. The heating-ventilating system should be quiet; ducts should be designed to minimize noise. Separate duct systems should serve noise and non-noise producing areas in the school.
- d. The mechanical engineer should specify the proper vibration and noise isolation equipment for ventilating fans and air compressors.
- e. Where unit ventilators are used, units that operate quietly should be specified.
- f. All fresh air for ventilation shall be filtered, tempered and adequately distributed by a ventilation supply unit and duct system.
- g. Humidification equipment shall be provided, preferably in the ventilating system, to maintain not less than 30 per cent relative humidity, and be automatically controlled.
- h. All ventilating requirements shall be provided by mechanical means in accordance with the given quantities of air.
- i. Toilet room ventilating systems should be entirely independent of those serving the rest of the building.
- j. When odors, obnoxious fumes, and dust arise from localized sources, they should be removed by special vents at those sources.

- k. Air from laboratories, janitor's room, storage rooms, paint and finishing rooms, kitchens, and toilets should be exhausted above roof line.
- l. Air intake grilles should be lap-louvred against the elements.
- m. Air exhaust openings should be adequately protected against weather and back drafts and should be at least as high as copings and other elevated roof sections except chimneys.
- n. Attics should have lap-louvered vents sufficient to provide free circulation of fresh air.
- o. Ventilation fans not conveniently accessible should be controlled by pilot light switches located in the principal's office and in the janitor's room.
- p. Attic and crawl spaces should be vented to outside air in accordance with Section 3.5, subsection 3.5.2 of the National Building Code of Canada 1965.

3. Operation and Maintenance Instructions

On completion of a building contract, the mechanical contractor should provide a complete instruction manual covering the function, operation, and maintenance of all systems and system components that contribute in providing the required building environment and facilities. This manual should be furnished to the boards operating personnel, and a competent technician should be provided for instruction purposes. The control contractor should furnish a framed schematic control diagram which should be located in the heating room.

4. Electrical

- a. Artificial lighting should be planned as a separate and sufficient system within itself, and not as a partial help for natural lighting.
- b. Artificial illumination should be designed to provide on the work of the pupils and chalkboards the following minimum levels of illumination expressed in maintained foot candles:

Classrooms, laboratories, libraries, commercial rooms,
home economics rooms, shops and offices70

Classrooms for pupils with impaired vision100

Typing rooms, drafting rooms, sewing rooms and art rooms 70

- Gymnasiums.....30
- Auditoriums, lunch rooms, and similar rooms not used
for study30
- Locker rooms, washrooms, stairways and corridors
containing lockers30
- Corridors and storerooms20
- c. All wiring shall be run in accordance with the provisions of the Canadian Electrical Code, and regulations issued under the Electrical Protection Act of the Province of Alberta.
 - d. Original wiring installation should anticipate future needs, including expansion of the building, and addition of electrical devices.
 - e. Both 110 and 220 volt single phase power should be provided for industrial arts shops, home economics rooms, physics room, and at the stage.
 - f. Conduit and wire should be installed with easy bends and a sufficient number of junction boxes so that wire can be easily pulled to facilitate making changes and repairs.
 - g. Switches for lights should be at the knob side of entries and approximately 50 inches from the floor. All switches should be flush-mounted safety switches.
 - h. Each row of lights parallel to the long wall of the room should be controlled by a separate switch, except in bilaterally lighted rooms.
 - i. In corridors and stairways the lights should be controlled by three-way switches located at each end of these spaces.
 - j. In auditoriums, gymnasiums and assembly rooms, some or all house lights should be controllable from a switch located convenient to the point of entry and the probable location of a portable movie projector.
 - k. Key switches should not be used for the general operation of lights.
 - l. The purpose for which the room is used should determine the number and location of convenience outlets. Provision should be in accordance with immediate and probable future needs.

- m. Regular classrooms should be provided with at least two duplex outlets; one at the rear of the room and one at the front.
- n. In a room which is being wired for motion picture, opaque, overhead, film-strip or slide projection, the following facilities should be provided;
 - i. A double wall plug, 110 V A.C. (1200 to 1500 watts) at the back of the room. The same at the front of the room.
 - ii. A light switch at the back to switch on an auxiliary light near the projector so that, if necessary, attention may be given to it without turning on the main lights.
 - iii. In the same panel as for the light switch above there should be a switch for about three ceiling lights which should be not too close to the screen. These lights should switch on independently of total lighting and would be for note-taking or answering questions during projection.
 - iv. Light switches at the front and also at the back of the room should control main lighting.
 - v. The speaking cable, running from the position of the projector to the position of the speaker at the front of the room, may be built into the wall or fixed permanently.
- o. Outlets supplying electric heating appliances shall be provided with an indicating pilot light.
- p. Corridors shall have convenience outlets not over 50 feet apart.
- q. Where radio or intercommunicating systems are to be provided, wiring for such systems shall be installed at the time of construction.
- r. Where fluorescent lighting is to be provided, the fluorescent fixtures should be of a type which shall not cause interference with radio reception.
- s. All electrical equipment apparatus, appliances, or materials used in the Province of Alberta shall be certified, and be so marked, by the Canadian Standards Association. In the case of assemblies of approved equipment, or special items of

equipment of which it is not practicable to obtain Canadian Standards Association certification, such equipment is subject to special inspection, tests, and labelling by the Electrical Protection Branch.

- t. Provision should be made for protection lighting on the building exterior to light up dark areas at night.
- u. Provision should be made for a television conduit system to facilitate future installation of a TV distribution system.

5. Gas

- a. Gas installations shall comply with the requirements of the Alberta Gas Protection Act. Mechanical plans for gas piping and gas appliances are to be submitted to the Gas Protection Branch for approval prior to commencing the gas installation.
- b. To insure against the dangers of gas leakage and of pupils' failure to shut off individual gas outlets in all laboratories and other rooms where more than one outlet is provided, a master shut-off valve shall be installed by means of which the gas supply to the whole room may be entirely interrupted. This valve shall have a locking device and be accessibly located.

6. Plumbing and Sanitary Facilities

- a. The installation of plumbing and sanitary facilities shall be in accordance with the Provincial Plumbing and Drainage Regulations as made and issued by the Department of Public Health.
- b. The number and type of fixtures provided will determine the area of the toilet room. Toilet rooms for general use should have a minimum width of 10 feet to allow for the economical placing of fixtures.
- c. The interior of washrooms and shower rooms should be effectually screened from observation.
- d. Washrooms and shower rooms should be clearly and properly marked.
- e. For pupil toilet rooms, water closets and urinals should be provided in accordance with Table 3.6.8.A of the National Building Code of Canada 1965.

At least two water closets should be installed in each general toilet room.

Step-up urinals should be avoided. Tile floor should be graded to the urinals for drainage purposes.

Wash basins should be provided in each toilet room in the ratio of one fixture to each 40 pupils.

Drinking fountains should be provided in the ratio of one to each 75 pupils.

There should be a minimum of one drinking fountain on each floor.

Drinking fountains should not be located in the toilet rooms.

Recommended height of fountain nozzles are:

Elementary - 32
Junior-Senior High - 36"

In shower rooms, gang-type showers, or shower cabinets may be installed. Where gang-type showers are used, provide shower heads in the ratio of one to each five (5) pupils in the class.

Shower rooms with shower heads on both walls should be at least 9' - 6" in width, with heads on one wall 6' - 6".

Shower heads should be installed in accordance with the following mounting heights:

	Girls	Boys
Elementary School	55"	60"
Junior-Senior High	60"	72"

Notes: Shower heights are from floor to face of shower head (not rough-in dimension).

Shower heights are for heads 8" from wall. Height should be higher if closer to wall.

Girls shower heights are shoulder high.

Protection against scalding water should be provided by means of controls or mixing chambers under the direct supervision of the teacher.

Hot water to shower heads should not exceed 120° F.

In each shower room, provide at least one shower cabinet.

Provide at least twelve (12) square feet of floor area for each shower head.

The floors, and walls from floor to ceiling should have a non-abrasive and impervious surface.

Floors should be of non-slip material.

Access to common staff washroom should be from the corridor and not the staffroom.

